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HYDRO-ELECTRIC INQUIRY COMMISSION

ENGINEERING DATA

PRINCIPAL CHARACTERISTICS OF H. E. P. C. PLANTS

WALTER J. FRANCIS, C. E.

CONSULTING ENGINEER



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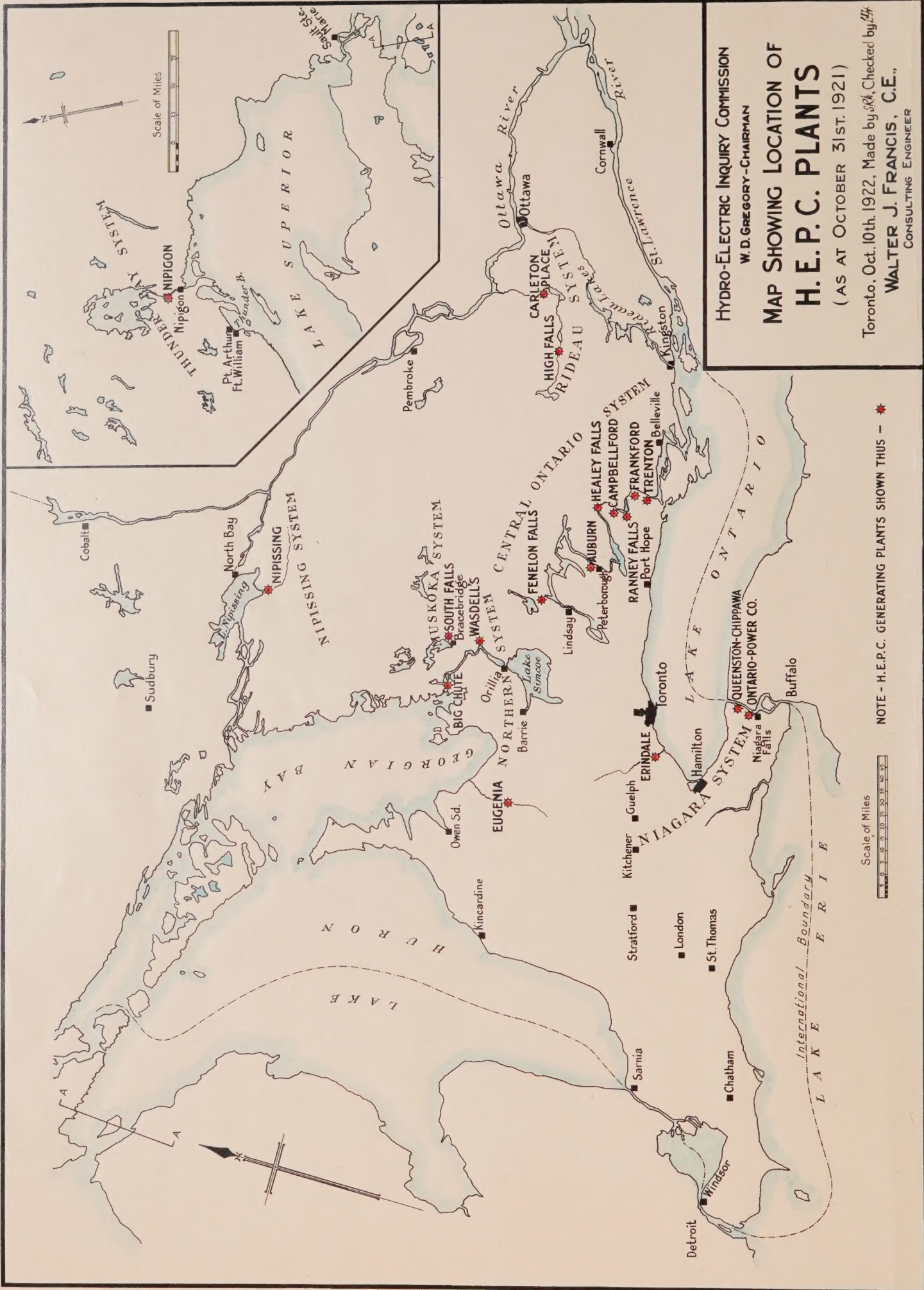
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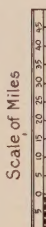
PRINCIPAL CHARACTERISTICS OF H.E.P.C. PLANTS

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HYDRO-ELECTRIC INQUIRY COMMISSION
W.D. GREGORY - CHAIRMAN
**MAP SHOWING LOCATION OF
H.E.P.C. PLANTS**
(AS AT OCTOBER 31ST. 1921)
Toronto, Oct. 10th. 1922, Made by *W.D.G.*, Checked by *W.D.G.*
WALTER J. FRANCIS, C.E.,
CONSULTING ENGINEER

NOTE - H.E.P.C. GENERATING PLANTS SHOWN THUS - *



WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(a)

Frontispiece

Map **COPY** showing location of H.E.P.C. Plants
as at October 31st, 1922.

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1900

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PRINCIPAL CHARACTERISTICS OF H.E.P.C. PLANTS

Walter J. Francis.

Preamble.

On July 13th, 1922, I received a preliminary memorandum from Mr. Commissioner R. A. Ross, on behalf of the Hydro-Electric Inquiry Commission, requesting a tabulation of the principal characteristics of the generating plants of the Hydro-Electric Power Commission. Subsequently after a personal interview the scope of the work was decided upon. Mr. Bower, the Secretary, wrote me formal instructions on July 17th, 1922, and I accordingly arranged to obtain the requisite data.

The collection of the data was assigned to Lt.-Col. Wilgar of our staff, and he proceeded to obtain all the figures possible from the official reports of the Hydro-Electric Power Commission, supplementing this by information obtained from departmental heads and other members of the staff of the Hydro-Electric Power Commission. He continued the collection of the data until his return to professorial duties at Queen's University in September, when it was taken up by Lt.-Col. Ellis who practically completed the collection of the information. Having been tabulated, the figures were submitted to Mr. Gaby in their complete form. Under date of October 10th, 1922, Mr. Gaby wrote me as follows:-

"We are sending herewith tabulations showing the principal characteristics of the Hydro-Electric Power Commission power plants as submitted for our approval. The same have been duly checked, and, as far as we are able to state in the time given

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for checking, the corrections have all been made. We believe the figures are accurate enough for all general purposes."

General

The generating plants in operation by the Hydro-Electric Power Commission of Ontario on October 31st, 1921, are eighteen in number and are designated as follows:- Nipissing, Nipigon, South Falls, High Falls, Carleton Place, Fenelon Falls, Auburn, Healey Falls, Campbellford, Ramsey Falls, Frankford, Trenton, Ontario Power Co., Brindale, Queenston-Chippawa, Eugenia, Waddell's and Big Chute. These plants are grouped into systems by the Hydro-Electric Power Commission in the following order:-

Systems	Plants
Nipissing	Nipissing
Thunder Bay	Nipigon
Muskoka	South Falls
Rideau	High Falls Carleton Place
Central Ontario	Fenelon Falls Auburn Healey Falls Campbellford Ramsey Falls Frankford Trenton
Niagara	Ontario Power Co. Brindale Queenston-Chippawa
Northern	Eugenia Waddell's Big Chute

By reference to the frontispiece the location of the several plants and their grouping in systems may be clearly seen. In a general way the frontispiece also shows the waterway on which each plant is located.

It is believed that the figures as compiled are accurate enough for general comparison and information. If, however, it be desired to make a critical study of any plant, careful consideration should be given to all the factors entering into the composition of the items.

I understand that Messrs. Price, Waterhouse & Co. through Mr. Landis, and Mr. Wegenast, are making a general report on the generating plants in regard to ownership and so forth, and that I am to confine my attention to the figures relating to the principal characteristics.

In the nine double pages of tables included herewith as pages 4 to 12 inclusive, the figures are given in order, having regard to the grouping of the generating plants into systems. For each of the eighteen plants forty-four questions are answered. The first twelve questions, being items 1 to 12 inclusive, refer to the hydraulic characteristics. The next six questions, being items 13 to 18 inclusive, have reference to the power characteristics and to the equipment of the generating plants. The next succeeding sixteen questions, being items 19 to 34 inclusive, have reference to historical data and capital costs, while the last group of questions, ten in number and marked items 35 to 44 inclusive, refer to operating costs and unit costs for the year ending October 31st, 1921, the four final items being deduced arithmetically from the earlier figures of fact.

1. Introduction
2. Methodology
3. Results
4. Discussion
5. Conclusion

Abstract
The purpose of this study is to investigate the effects of various factors on the performance of a system. The study is divided into five main sections: Introduction, Methodology, Results, Discussion, and Conclusion. The methodology section describes the experimental setup and the data collection process. The results section presents the findings of the study, and the discussion section provides an analysis of the results. The conclusion section summarizes the main findings and suggests areas for future research.

COPY

1. Introduction
2. Methodology
3. Results
4. Discussion
5. Conclusion
6. References
7. Appendix
8. Glossary
9. Index
10. Bibliography

Item	Hydroelectric
<u>HYDRAULIC CHARACTERISTICS OF THE PLANT OF THE HYDRO-</u>	
1 Name of River	South
2 Drainage Area, Square Miles	294
3 Minimum Precipitation per Annum, Inches	30.9
4 Mean Precipitation per Annum, Inches	34.4
5 Minimum Run-off per Month, Cubic Feet per Second	62
6 Mean Run-off per Annum, Cubic Feet per Second	420
7 Turbine Head, Minimum, Feet	88
8 Turbine Head, Mean, Feet	90
9 Years of Precipitation Records	1916 to 1919
10 Years of Gauging Records	1914 to 1921
11 Water Horse Power, Mean	4,300
12 Water Storage, Million Cubic Feet	965

POWER CHARACTERISTICS AND EQUIPMENT OF THE PLANT OF THE

13 Turbines,	
Number and Rating of each, Horse Power	1 @ 1,100
	1 @ 1,400
Total Installed Rating, Horse Power	2,500
14 Generators,	
Number and Rating of each, Kilowatts	1 @ 450
	1 @ 1,050
Total Installed Rating, Kilowatts	1,500
15 Transformers,	
Number and Rating of each, Kilo-Volt-Amperes .	3 @ 900
Total Installed Rating, Kilo-Volt-Amperes	2,700
16 Voltage of Output	22,000
17 Frequency, Cycles	60
18 Overall Efficiency of Plant	85%

Nipigon
2 Units

South Falls

High Falls

Carlton Place

ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

Nipigon Muskogee Mississippi Mississippi

9,100 677 460 1,150

16.8 35.0 31.5 31.5

23.0 41.5 35.0 35.0

5,750 205 96 305

6,500 965 515 1,161

75 102 76 9

78 108 78 10.5

1878 to 1920 1877 to 1920 1915 to 1919 1915 to 1919

1905 to 1921 1915 to 1920 1915 to 1922 1919 to 1921

57,600 12,100 4,550 1,390

209,005 1,050 3,620 3,500

HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

2 @ 12,500 1 @ 750 5 @ 1,200 3 @ 245

1 @ 1,000

25,000 1,750 3,600 755

2 @ 8,500 1 @ 360 4 @ 250 1 @ 150

1 @ 600

1 @ 700

1 @ 250

17,000 960 2,100 405

4 @ 6,000 5 @ 400 3 @ 750 3 @ 250

32,000 1,200 2,250 750

1 spare

110,000 22,000 26,400 26,400

60 60 60 60

9 1/2% 8 1/2% 7 1/2% 8 1/2%

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Items	Pouillon Falls	Auburn
<u>HYDRAULIC CHARACTERISTICS OF THE PLANTS OF THE HYDRO-</u>		
1 Name of River	Sturgeon	Otonabee
2 Drainage Area, Square Miles	1,235	2,870
3 Minimum Precipitation per Annum, Inches	23.1	23.1
4 Mean Precipitation per Annum, Inches	52.3	52.3
5 Minimum Run-off per Month, Cubic Feet per Second ...	\$250	\$750
6 Mean Run-off per Annum, Cubic Feet per Second	\$	\$
7 Turbine Head, Minimum, Feet	22.5	17.5
8 Turbine Head, Mean, Feet	22.5	17.5
9 Years of Precipitation Records	1883 to 1914 ...	1883 to 1914
10 Years of Gauging Records	1911 to 1921 ...	1911 to 1921
11 Water Horse Power, Mean	\$	\$
12 Water Storage, Million Cubic Feet	3,500	3,313

Note:— Items marked thus, \$, indicate that

POWER CHARACTERISTICS AND EQUIPMENT OF THE PLANTS OF THE

13 Turbines,		
Number and Rating of each, Horse Power	2 @ 500	3 @ 950
Total Installed Rating, Horse Power	1,000	2,850
14 Generators,		
Number and Rating of each, Kilowatts	2 @ 350	3 @ 500
Total Installed Rating, Kilowatts	700	1,500
15 Transformers,		
Number and Rating of each, Kilo-Volt-Amperes .	7 @ 125	2 @ 1,875
Total Installed Rating, Kilo-Volt-Amperes	945	3,750
	1 spare	
16 Voltage of Output	11,000 ..	6,600, and 2,400
		to 44,000
17 Frequency, Cycles	60	60
18 Overall Efficiency of Plant	82%	82%

Honley Falls	Campbellford	Ramsey Falls	Frankford	Tranton
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ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

Front	Front	Front	Front	Front
3,500	4,200	4,200	4,500	4,800
23.1	23.1	23.1	23.1	23.1
32.3	32.3	32.3	32.3	32.3
\$750	\$820	\$820	\$820	\$820
\$1,200	\$	1,400	\$	\$
74	22.5	47	17	18.6
74	22.5	54	17	18.6
1883 to 1921	1883 to 1914	1883 to 1914	1883 to 1914	1883 to 1914
1911 to 1921	1911 to 1921	1911 to 1921	1911 to 1921	1911 to 1921
\$10,100	\$	\$5,600	\$	\$
3,500	3,500	3,500	3,500	3,500

flow is regulated by the Department of Railways and Canals of Canada.

HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

3 @ 5,600	5 @ 1,100	2 @ 5,300 Summer	4 @ 1,200	4 @ 1,400
		2 @ 5,500 Winter		
16,800	5,500	10,000 Summer	4,800	5,600
		11,000 Winter		
3 @ 3,000	3 @ 600	2 @ 5,600 Summer	4 @ 650	4 @ 750
		2 @ 4,250 Winter		
9,000	3,000	7,200 Summer	2,600	3,000
		8,500 Winter		
3 @ 5,750	4 @ 1,125	2 @ 4,500	None	3 @ 3,000
11,250	4,500	9,500	None	9,000
44,000	44,000	44,000	6,600	6,600
				to 44,000
60	60	60	60	60
85%	82%	88%	87%	82%

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The following table shows the results of the experiment.

Item	Value
1	10
2	20
3	30
4	40
5	50
6	60
7	70
8	80
9	90
10	100

The results of the experiment are as follows:

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Item	Ontario Power Co.	Brindale
<u>HYDRAULIC CHARACTERISTICS OF THE PLANT OF THE HYDRO-</u>		
1 Name of River	Niagara	Credit
2 Drainage Area, Square Miles	263,440	450
3 Minimum Precipitation per Annum, Inches	Not Relevant	26.6
4 Mean Precipitation per Annum, Inches	Not Relevant	32.2
5 Minimum Run-off per Month, Cubic Feet per Second. Not Relevant	Not Relevant	70
6 Mean Run-off per Annum, Cubic Feet per Second ...	Not Relevant	305
7 Turbine Head, Minimum, Feet	175	Not Ascertained ..
8 Turbine Head, Mean, Feet	180 about ..	56, latterly 57 ..
9 Years of Precipitation Records	Not Relevant ...	1888 to 1920
10 Years of Gauging Records	Not Relevant ...	1914 to 1920
11 Water Horse Power, Mean	250,000	2,450
12 Water Storage, Million Cubic Feet	Not Relevant ..	None at Present ..

POWER CHARACTERISTICS AND EQUIPMENT OF THE PLANTS OF THE

13 Turbines,	7 @ 11,600	
Number and Rating of each, Horse Power	5 @ 15,000	2 @ 840
	2 @ 16,000	
	2 @ 18,000	
Total Installed Rating, Horse Power	225,600	1,680
14 Generators,	3 @ 7,500	
Number and Rating of each, Kilowatts	11 @ 8,776	2 @ 600
	2 @ 15,000	
Total Installed Rating, Kilowatts	149,036	1,200
15 Transformers,		
Number and Rating of each, Kilo-Volt-Amperes + 18 @ 3,000		None
Total Installed Rating, Kilo-Volt-Amperes	54,000	None
16 Voltage of Output	60,000, 30,000, 12,000 and + 12,200	
	2,200	
17 Frequency, Cycles	25	60
18 Overall Efficiency of Plant	85%	82%

Neenston-Gilgawa 5 Units	Dugonia	Waddell's	Big Chute
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ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

Niagara	Beaver	Seyern	Seyern
263,440	76	2,075	2,265
Not Relevant	34.2	24.2	24.2
Not Relevant	37.8	32.4	32.5
Not Relevant	60	1,000	1,000
Not Relevant	88	2,000	2,500
296 about	515	9	56
305 about	524	12	56
Not Relevant	1916 to 1921	1873 to 1916	1873 to 1916
Not Relevant	1913 to 1921	1913 to 1918	1913 to 1918
300,000 about	5,240	2,730	15,900
Not Relevant	740	16,500	16,500

HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

5 @ 55,000 on order ..	2 @ 2,250	2 @ 600	3 @ 1,300
	1 @ 4,000		1 @ 2,300
500,000 about	8,500	1,200	6,300
5 @ 36,000 on order ..	2 @ 1,200	2 @ 320	3 @ 720
	1 @ 2,400		1 @ 1,260
180,000 about	4,800	640	3,440
15 @ 15,000 on order	6 @ 900	7 @ 150	7 @ 600
225,000 about	5,400	1,050	4,200
		1 spare	1 spare
12,000 to 110,000	22,000	22,000	22,000
25	60	60	60
90% about	85%	80%	82%

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HIPPLING SYSTEM

Item	Hipling
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HISTORICAL DATA AND CAPITAL COSTS OF THE PLANTS OF

19	Maximum Demand in 1921, Kilowatts	1,265
20	Load Factor for Year 1921	49.1%
21	Output for 1921, Average, Kilowatts	620
22	Power Factor Limits	85% to 92%
23	Construction Year	1910 to 1911
24	Extension Year	1920 to 1921
25	Purchase Year	1916
26	Present Owner	Ontario
27	Capital Cost, Lands and Water Rights	\$ 31,324
28	Capital Cost, Dams and Water Structures	\$121,485
29	Capital Cost, Power House	\$ 28,577
30	Capital Cost, Equipment	\$104,530
31	Capital Cost, Intangible Assets	\$ 37,681
32	Capital Cost, Total	\$323,597
33	Capital Cost per Horse Power, 1921, Average Output	\$ 369
34	Capital Cost per Horse Power, Turbine Rating	\$ 147

THUNDER BAY SYSTEM

MUSKOGA SYSTEM

KIDMAN SYSTEM

Kirkton
& Units

South Falls

High Falls

Carlton Place

THE HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

..... 9,600	1,056	1,375	Not Operating
..... 40.6%	50.6%	34.6%	Not Operating
..... 3,920	537	490	Not Operating
..... 78.1% to 100%	72% to 79%	40% to 75%	Not Operating
..... 1919 to 1921	1915 to 1916	1919	1910
..... None	1915 to 1916	None	1913
..... None	1915	1918	1920
..... H.E.P.C.	H.E.P.C.	H.E.P.C.	H.E.P.C.
... Included in Item 28	\$ 17,534	\$ 10,478	\$ 10,275
..... \$4,151,066	\$ 52,923	\$279,537	\$ 12,480
..... \$ 557,963	\$ 20,518	\$240,758	\$ 20,682
..... \$ 948,955	\$ 57,546	\$164,711	\$ 17,464
..... \$ None	\$ None	\$ None	\$ None
..... \$5,637,974	\$149,321	\$695,414	\$ 60,871
..... \$ 1,075	\$ 216	\$ 1,064	Not Operating
..... \$ 226	\$ 85	\$ 193	Not Operating

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CENTRAL

Item	Fenelon Falls	Subaru
<u>HISTORICAL DATA AND CAPITAL COSTS OF THE PLANTS OF</u>		
19 Maximum Demand in 1921, Kilowatts	700	2,000
20 Load Factor for Year 1921	57%	66%
21 Output for 1921, Average, Kilowatts	400	1,320
22 Power Factor Limits	50% to 90%	50% to 90%
23 Construction Year	1899	1911 to 1912
24 Extension Year	None	None
25 Purchase Year	1916	1916
26 Present Owner	COPY Ontario	Ontario
27 Capital Cost, Lands and Water Rights	\$ 23,395	\$ 25,140
28 Capital Cost, Dams and Water Structures	\$ 1,426	\$ 56,543
29 Capital Cost, Power House	\$ 3,130	\$116,108
30 Capital Cost, Equipment	\$ 48,604	\$ 69,624
31 Capital Cost, Intangible Assets	\$150,979	\$137,500
32 Capital Cost, Total	\$226,555	\$416,910
33 Capital Cost per Horse Power, 1921, Average Output .	\$442	\$ 235
34 Capital Cost per Horse Power, Turbine Rating	\$227	\$ 146

ONTARIO

SYSTEM

Hewley Falls

Campbellford

Remy Falls

Frankford

Tranton

THE HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

12,300	3,160	None	2,860	4,000
30%	57%	None	51%	51%
3,600	1,800	None	1,460	2,040
50% to 90%	50% to 90%	50% to 90%	50% to 90%	50% to 90%
1913 to 1914	1910	1920 to 1922	1913	1911
1919	None	None	None	None
1916	1916	None	1916	1916
Ontario	Ontario	Ontario	Ontario	Ontario
\$ 9,706	\$ 2,979	\$ 37,800	\$ 2,182	\$ 14,746
\$ 575,204	\$ 44,630	\$ 197,800	\$ 79,261	\$ 43,285
\$ 147,300	\$ 66,100	\$ 567,850	\$ 21,489	\$ 31,596
\$ 461,676	\$ 172,587	\$ 666,850	\$ 144,394	\$ 141,400
\$ 325,000	\$ 100,000	\$ 225,000	\$ 125,000	\$ 125,000
\$ 1,518,974	\$ 368,465	\$ 1,695,300	\$ 371,426	\$ 356,027
\$ 306	\$ 161	None	\$ 190	\$ 130
\$ 90	\$ 71	\$ 170	\$ 77	\$ 64

1970-1971

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1970-1971

1970-1971

1970-1971

COPY

N I A G A R A

Item	Ontario Power Co.	Brindale
<u>HISTORICAL DATA AND CAPITAL COSTS OF THE PLANT OF</u>		
19 Maximum Demand in 1921, Kilowatts	149,800	680
20 Load Factor for Year 1921	63.2%	65%
21 Output for 1921, Average, Kilowatts	94,000	453
22 Power Factor Limits	81.5% to 87%	90% to 95%
23 Construction Year	1913 to 1915	1913
24 Extension Year	1906 to 1919	None
25 Purchase Year	1917	1917
26 Present Owner	Ontario	H.E.P.C.
27 Capital Cost, Lands and Water Rights ..	Included in Item 31	Included in Item 29
28 Capital Cost, Dams and Water Structures	\$ 5,927,125	\$36,255
29 Capital Cost, Power House	\$ 2,674,566	\$ 3,587
30 Capital Cost, Equipment	\$ 3,232,306	\$32,122
31 Capital Cost, Intangible Assets	\$19,000,000	\$ None
32 Capital Cost, Total	\$22,834,065	\$31,942
33 Capital Cost per Horse Power, 1921, Average Output .	\$175	\$ 504
34 Capital Cost per Horse Power, Turbine Rating	\$ 98	\$ 55

SYSTEM

NORTHERN SYSTEM

Hemlock-Chipmunk

5 Units

Bryonia

Randall's

Big Ounce

THE HYDRO-ELECTRIC POWER OPERATIONS AS AT OCTOBER 31st. 1921.

None	4,390	660	4,390
None	56.1%	49.7%	41.5%
None	1,580	427	1,793
Not Known	46% to 98%	90% to 100%	84% to 99%
1917 to 1923	1914 to 1915	1913 to 1914	1919
None	1917 to 1918	None	1915 to 1919
Not Relevant	1914	1913	1914
H.E.P.C.	H.E.P.C.	H.E.P.C.	H.E.P.C.
Not Established	\$127,254	\$ 8,140	\$ 1,540
Not Established	\$439,790	\$ 19,483	\$143,865
Not Established	\$144,788	\$ 50,118	\$ 57,646
Not Established	\$278,416	\$ 64,544	\$323,190
Not Established	\$ None	\$ None	\$124,011
Not Established	\$990,273	\$141,885	\$652,235
Not Established	\$ 476	\$ 249	\$ 272
Not Established	\$ 116	\$ 116	\$ 130

NIPISSING STATION

Item

Nipissing

OPERATING AND UNIT COSTS FOR 1921 FOR THE PLANT OF

35	Operating Cost, Labour, and	
36	Operating Cost, Material	\$ 9,450
37	Maintenance, including Taxes, Depreciation, etc.	\$ 4,953
38	Municipal Expense	\$ None
39	Fixed Charges	\$15,680
40	Total Operating Expense	\$30,113
41	Operating Cost, Minus Fixed Charges, per Horse Power, 1921, Average Output	\$ 17.40
42	Operating Cost, Minus Fixed Charges, per Horse Power, Turbine Rating	\$ 6.87
43	Operating Cost, Plus Fixed Charges, per Horse Power, 1921, Average Output	\$ 36.50
44	Operating Cost, Plus Fixed Charges, per Horse Power, Turbine Rating	\$ 13.66

WILSON BAY SYSTEM MUSKOGEE SYSTEM

RIDMAN SYSTEM

Wipigon
2 Units

South Falls

High Falls

Carlton Place

THE HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

.....\$ 12,121	\$ 4,662	\$ 5,294	Not Operating
.....\$ 2,069	\$ 362	\$ 1,435	Not Operating
.....\$ 15,759	\$ 2,502	\$ 2,777	Not Operating
.....\$ 432	\$ 510	\$ 1,071	Not Operating
.....\$157,000	\$11,261	\$43,346	Not Operating
.....\$185,641	\$19,297	\$53,353	Not Operating
.....\$ 5.45	\$ 11.70	\$ 16.00	Not Operating
.....\$ 1.15	\$ 4.60	\$ 2.94	Not Operating
.....\$ 25.30	\$ 27.00	\$ 62.50	Not Operating
.....\$ 7.45	\$ 11.00	\$ 15.00	Not Operating

THE UNIVERSITY OF CHICAGO

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WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

C E N T R A L

Item	Fondelon Falls	Anbura
<u>OPERATING AND UNIT COSTS FOR 1921 FOR THE PLANTS OF</u>		
35 Operating Cost, Labour, and		
36 Operating Cost, Material	\$ 5,797	\$ 9,522
37 Maintenance, including Taxes, Depreciation, etc..	\$ 1,710	\$ 1,450
38 Municipal Expense	\$ None	\$ None
39 Fixed Charges	\$12,600	\$23,180
40 Total Operating Expense	\$23,197	\$34,152
41 Operating Cost, Minus Fixed Charges, per Horse Power, 1921, Average Output	\$ 16.00	\$ 6.20
42 Operating Cost, Minus Fixed Charges, per Horse Power, Turbine Rating	\$ 7.50	\$ 3.85
43 Operating Cost, Plus Fixed Charges, per Horse Power, 1921, Average Output	\$ 37.50	\$ 19.30
44 Operating Cost, Plus Fixed Charges, per Horse Power, Turbine Rating	\$ 20.00	\$ 12.00

ONTARIO

SYSTEM

Healey Falls

Campbellford

Ranney Falls

Frankford

Trenton

THE HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.

..... \$ 40,452 \$18,513 Not Operating \$16,869 \$21,874

..... \$ 4,859 \$ 4,516 Not Operating \$ 1,186 \$ 2,182

..... \$ None \$ None None \$ None \$ None

..... \$ 84,400 \$21,650 Not Operating \$20,650 \$19,860

..... \$129,711 \$44,479 Not Operating \$38,705 \$43,916

..... \$ 9.10 \$ 9.50 Not Operating \$ 9.20 \$ 8.50

..... \$ 1.62 \$ 4.15 Not Operating \$ 3.75 \$ 4.30

..... \$ 26.30 \$ 18.50 Not Operating \$ 19.70 \$ 15.05

..... \$ 4.65 \$ 8.10 Not Operating \$ 8.95 \$ 7.85

N I A G A R A

Item	Ontario Power Co.	Brindale
<u>OPERATING AND UNIT COSTS FOR 1921 FOR THE PLANTS OF</u>		
35 Operating Cost, Labour, and		
36 Operating Cost, Material	\$ 180,087	\$ 5,071
37 Maintenance, including Taxes, Depreciation, etc. ...	\$ 124,058	\$ 1,229
38 Municipal Expense	None	None
39 Fixed Charges	\$1,618,840	\$ 8,137
40 Total Operating Expense	\$1,922,985	\$14,437
41 Operating Cost, Minus Fixed Charges, per Horse Power, 1921, Average Output	\$ 2.41	\$ 34.62
42 Operating Cost, Minus Fixed Charges, per Horse Power, Turbine Rating	\$ 1.25	\$ 3.75
43 Operating Cost, Plus Fixed Charges, per Horse Power, 1921, Average Output	\$ 15.25	\$ 79.32
44 Operating Cost, Plus Fixed Charges, per Horse Power, Turbine Rating	\$ 8.50	\$ 8.59

SYSTEM

NORTHERN SYSTEM

Moonsville-Chippewa 5 Units	Eugenia	Waddell's	Big Chute
<u>THE HYDRO-ELECTRIC POWER COMMISSION AS AT OCTOBER 31st, 1921.</u>			
Not Operating	\$ 13,881	\$ 5,255	\$ 8,047
Not Operating	\$ 3,383	\$ 769	\$ 1,783
Not Operating	\$ 15,766	\$ 2,259	\$ 7,842
None	\$ 5,034	\$ 994	\$ 3,372
Not Operating	\$ 70,540	\$ 9,634	\$ 66,820
None	\$ 205,634	\$ 18,821	\$ 77,864
Non Existent	\$ 16.40	\$ 16.00	\$ 8.80
Non Existent	\$ 4.00	\$ 7.65	\$ 5.25
Non Existent	\$ 50.75	\$ 32.90	\$ 32.50
Non Existent	\$ 12.40	\$ 15.70	\$ 12.00

General Notes

The whole of the foregoing information has been obtained from the records of the Hydro-Electric Power Commission or has been based thereon by deduction, and it refers to the conditions as they existed on the 31st of October, 1921.

The Carleton Place plant, of the Rideau system, did not operate during the year 1921. The Ranney Falls plant, of the Central Ontario system, and the Queenston-Chippawa plant, of the Niagara system, were still incomplete on October 31st, 1921. The Brindale plant, also of the Niagara system, operated only nine hours per day during 1921, so that the figures given under items 41 to 44, inclusive, are not comparable with those of the other plants. In the case of the plants of the Central Ontario system and of the Niagara system, the operating cost has not been separated as between labour and material on the records, and this division is not readily ascertainable.

Walter J. Francis
Consulting Engineer.

Toronto, October 10th, 1922.
